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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/633,614      | 08/05/2003  | Motohide Takeichi    | 106973.01           | 5380             |

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| EXAMINER |
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CHANG, VICTOR S

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| ART UNIT | PAPER NUMBER |
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1771

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/633,614

Applicant(s)

TAKEICHI ET AL.

Examiner

Victor S. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1 and 6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Introduction***

1. Applicants' amendments and remarks filed on 9/18/2006 have been entered. Claim 1 has been amended. Claims 4 and 5 are cancelled. Claims 1 and 6 are active.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Rejections Based on Prior Art***

3. Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiobara et al. [US 6083774] in view of Shiobara et al. [US 6001901].

Shiobara '774 relates to mounting a semiconductor chip on a circuit substrate. The space between the semiconductor chip and the circuit substrate is sealed with an encapsulating resin composition in molten state. The composition contains (a) an epoxy resin, (b) a curing agent, and (c) an inorganic filler (a thermosetting resin with an inorganic filler) [abstract]. The inorganic filler has a mean particle size from 1 to 15  $\mu\text{m}$ , more desirably 2 to 10  $\mu\text{m}$ ; the maximum particle size is up to 24  $\mu\text{m}$ , more desirably up to 20  $\mu\text{m}$ , most desirably up to 10  $\mu\text{m}$ ; its specific surface area (BET adsorption method) is 3.5 to 6.0  $\text{m}^2/\text{g}$ . The amount of fused silica (inorganic filler) is preferably 100 to 550 parts, more preferably 200 to 450 parts by weight per 100 parts by weight of the epoxy resin and the curing agent combined. Less than 100 parts of fused silica or alumina would be too small to fully reduce the coefficient of expansion whereas

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compositions containing more than 550 parts of fused silica or alumina would become too viscous to mold.

For claims 1 and 6, Shiobara '774 is silent about the specific surface area of the inorganic filler. However, Shiobara '901 relates to a resin having generally the same composition of an epoxy resin, a curing agent, and an inorganic filler, and the inorganic filler, and are for the same use as an encapsulant (a molding compound for semiconductor devices) for advanced thin packages as the instant invention [abstract; col. 1, lines 7-9]. The preferred inorganic filler has a mean particle size of 4 to 30  $\mu\text{m}$ , more preferably 10 to 25  $\mu\text{m}$ , a particle size distribution that fine particles having a particle size of at most 3  $\mu\text{m}$ , account for 10 to 40% by weight of the filler and the maximum particle size is less than 100  $\mu\text{m}$ , more preferably less than 74  $\mu\text{m}$ , and a specific surface area of 1.5 to 6  $\text{m}^2/\text{g}$  [col. 4, line 62 through column 5, line 2]. Shiobara '901 teaches that a fraction of the filler ranging from a mean particle size of 3  $\mu\text{m}$  to ultrafine silica plays a very important role in achieving the closest packing of the filler by imparting thixotropy to the composition to reduce its viscosity, and hence to control the flow of the composition. The fraction of the filler ranging downward from a mean particle size of 3  $\mu\text{m}$  is desirably obtained by properly mixing ultrafine silica having a mean particle size of less than 0.05  $\mu\text{m}$ . Preferably, the microparticulate filler, which has a mean particle size of 0.05 to 0.3  $\mu\text{m}$ , is spherical, and has a specific surface area of 10 to 40  $\text{m}^2/\text{g}$ . Preferably, the filler, which has a mean particle size of 0.5 to 3  $\mu\text{m}$ , is also spherical, and has a specific surface area of 5 to 40  $\text{m}^2/\text{g}$  [col. 5, lines 21-38]. It would have been obvious to one of ordinary skill in the art to incorporate a fraction of inorganic filler which has a specific surface area of 5 to 40  $\text{m}^2/\text{g}$ , as taught by Shiobara '901, in the encapsulating resin composition of Shiobara '774, while maintaining a mean specific surface

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area of 3.5 to 6.0 m<sup>2</sup>/g, motivated by the desire to obtain the closest packing of the filler by imparting thixotropy to the composition to reduce its viscosity, and hence to control the flow of the composition. Further, while the prior art is silent about the volume percent of the silica filler, since the combined teaching of prior art teaches generally the same composition for the same use (a curable resin with a silica filler for mounting semiconductor chip to a circuit board) as the instant invention, a suitable amount (or volume percent) of the inorganic filler is reasonably considered to be an obvious optimization to one skilled in the art of semiconductor encapsulation adhesive, motivated by the desire to provide required heat conductivity and flow viscosity. *In re Aller*, 105 USPQ 233.

Regarding newly added limitation “anisotropic conductive” in the preamble, since the limitation does not structurally or compositionally affect the use of the adhesive as a semiconductor encapsulant, and appears to be an inherent property, it is not given any patentable weight. Regarding the limitation of the range of mean particle sizes (incorporated from cancelled claim 4), applicants are reminded that the teaching of Shiobara ‘774 encompasses the claimed range, as set forth above. Finally, regarding the limitation of the coefficient of moisture absorption (incorporated from cancelled claim 5), since Shiobara ‘774 teaches generally the same encapsulant as the instant invention, and shows that the resulting semiconductor device has improved moisture resistance and reliability in a comparative study [col. 1, lines 45-46; col. 11, lines 35-65], a suitable coefficient of moisture absorption is reasonably considered to be an obvious routine optimization to one skilled in the art of semiconductor encapsulant.

***Response to Argument***

4. Applicants argue at page 5 that neither reference teaches or suggests employing fillers in the amount of 35 to 60%, or providing an anisotropic conductive adhesive material having the claimed coefficient of moisture absorption. However, while the prior art is silent about the volume percent of the silica filler, since the combined teaching of prior art teaches generally the same composition for the same use (a curable resin with a silica filler for mounting semiconductor chip to a circuit board) as the instant invention, a suitable amount (or volume percent) of the inorganic filler for use as an anisotropic conductive adhesive is reasonably considered to be an obvious optimization to one skilled in the art of semiconductor encapsulation, motivated by the desire to provide required heat conductivity and flow viscosity.

At pages 5-6, bridging paragraph, applicants request reconsideration of claims 4-6. However, claims 4 and 5 have been cancelled, and the cancelled limitations have been re-addressed in amended claim 1, as set forth above. Further, since the prior art teaches an encapsulation adhesive for semiconductor, claim 6 is also rejected, as set forth above.

***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor S. Chang whose telephone number is 571-272-1474. The examiner can normally be reached on 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel H. Morris can be reached on 571-272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*VSC*  
Victor S Chang  
Examiner  
Art Unit 1771

10/9/06

  
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